# PATENT CLAIMS

1. A fuel cell installation, comprising
   - a reformer stage (1) designed to be heatable with a gas burner (8) for steam reforming of hydrocarbons and steam into hydrogen and other reformer products,
   - at least one shift stage (2) downstream from the reformer stage (1) for chemical processing of the reformer products and
   - at least one fuel cell stack (3) having a plurality of anodes (4) and cathodes (5) with corresponding inlet and outlet connections (6, 7) downstream from the shift stage (2) for converting the hydrogen into water for generating electricity and heat,

   characterized in that
   - the fuel cell stack (3) is designed as a high-temperature fuel cell stack having an operating temperature between 100°C and 200°C,
   - the shift stage (2) is connected at the outlet end to the inlet connection (6) of the anodes (4) of the fuel cell stack (3) without a heat exchanger, and
   - the outlet connection (7) of the anodes (4) of the fuel cell stack (3) is connected to an air inlet connection (9) on the gas burner (8).

2. The fuel cell installation according to Claim 1, characterized in that the fuel cell stack (3) is provided with proton-conducting high-temperature electrolyte membranes.

3. The fuel cell installation according to Claim 2, characterized in that the high-temperature electrolyte membranes comprise at least one basic material and at least one dopant, whereby the dopant is a reaction product of an at least dibasic inorganic acid with an organic compound, whereby the reaction product has an unreacted acidic

hydroxyl group of the inorganic acid or the condensation product of this compound with a polybasic acid.

4. The fuel cell installation according to any one of Claims 1 through 3,
characterized in that
to ensure the operating temperature of 100°C to 200°C, a temperature regulating device is provided, shutting down the fuel cell stack (3) at an operating temperature above 200°C.

5. The method for starting a fuel cell installation according to any one of Claims 1 through 4, whereby exclusively air is supplied to the reformer stage (1) and the shift stage (2) in at least some phases when starting up the installation,
characterized in that
- in a first startup step ($I_s$), preheated air is passed through the reformer stage (1), through the shift stage (2) and, on the anode end, through the fuel cell stack (3), whereby the air flowing through the fuel cell stack (3) on the anode end is supplied to the gas burner (8) which is provided for heating the reformer stage (1) and
- in a second startup step ($II_s$), the air supply is turned off and at least the steam supply and optionally also the hydrocarbon gas supply are turned on.

6. The method according to Claim 5,
characterized in that
the temperature of the air used to start the fuel cell installation increases with an increase in the length of the first startup step.

7. The method for shutting down a fuel cell installation according to any one of Claims 1 through 4, whereby the reformer stage (1) and the shift stage (2) receive

exclusively air in at least some phases during startup and shutdown of the installation,
characterized in that

- in a first shutdown step ($II_A$) the hydrocarbon gas supply and the steam supply are shut down, and
- in a second shutdown stage ($I_A$), the air supply is turned on and the air is sent through the reformer stage (1), through the shift stage (2) and, at the anode end, through the fuel cell stack (3), whereby the air flowing through the fuel cell stack (3) on the anode end is sent to the gas burner (8) that is provided for heating the reformer stage (1).

8. The method according to Claim 7,
characterized in that
the temperature of the air used to shut down the fuel cell installation decreases with an increase in length of the second shutdown step.